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Evolution of Tuberculosis.—Data on primary tuberculosis, based on observation on 1,687 children examined at the Lymanhurst School for Tuberculous Children in Minneapolis, are given. Each individual included in this group received an intracutaneous injection of 0.1 mgm. of Old Tuberculin, and during periods of observation, ranging from 4 to 11 years, the positive tuberculin reactors have had repeated roentgen and physical examinations. Of the 1,687 children, 1,108 had negative reactions and 579 positive reactions to 0.1 mgm. of Old Tuberculin. Repeated roentgen films of the chest of 1,108 intracutaneous-negative cases were found to be consistently negative in an average of 90.1 per cent of this group. In 5.3 per cent of this group, lesions due to conditions other than tuberculosis were noted. These lesions included pleural thickenings, bronchiectasis and pneumonia. Among the 579 infected children, only 44.4 per cent were reported as entirely normal on roentgen examination. The earliest and most extensive of the lesions are represented by parenchymal infiltrations, of which 27, or 4.7 per cent, were found in the entire group. The other lesions representative of the childhood type of tuberculosis included lymph-node calcifications and Ghon tubercles, and among the 579 positive intracutaneous children, there were 173, or 29.9 per cent, of the former and 67, or 11.6 per cent, of the latter. Primary tuberculous infections of the lungs are revealed by the roentgen-ray films as parenchymal infiltrations, calcified lymph nodes and Ghon tubercles. These lesions, although varied in appearance, merely represent different stages in the development of one and the same clinical condition, namely, primary tuberculosis, or tuberculosis of the childhood type. The general tendency for lesions resulting from an initial infection by the tubercle bacillus is first to resolve and later to calcify. The human body can resolve a tuberculous infection into what is known as the primary complex only once. When once reduced to calcified scars, these primary tuberculous lesions do not become reactivated later in the production of the adult type of tuberculosis (consumption). Death seldom and possibly never results from a single primary pulmonary tuberculous infection. The prognosis is excellent in infancy as well as later in childhood provided reinfection is prevented. Primary tuberculous infections of the lung, if extensive, produce symptoms of varying severity, which subside in the course of a few to several weeks. Afterward, throughout the remainder of the life of the patient, these primary lesions produce no clinical symptoms. (Occasionally a very large Ghon tubercle, acting as a foreign body, may erode a blood-vessel and cause haemoptysis, and in rare instances may be expelled from the lung in coughing.) Consumption (phthisis) does not develop as a result of an initial infection by the tubercle bacillus. The first infection occurring at any age in life uniformly resolves and calcifies. Consumption develops following a reinfection of individuals who previously have had a primary infection. The reinfection responsible for the

development of phthisis is probably exogenous in origin in the majority of cases. The lesions of reinfection (adult type of tuberculosis or phthisis) usually appear in the subapical portions of the lungs. These lesions may be present for months and years, without producing symptoms, physical findings or showing any tendency to spread. During the teens, previously dormant lesions characteristic of the adult type of tuberculosis frequently tend to spread, to produce cavities and to cause death. The adult type of tuberculosis seldom calcifies. Puberty seems to favor the breaking down of previously existing apparently quiescent subapical infiltrations of the adult type of tuberculosis. However, primary infections, occurring during puberty, behave much the same as do similar infections taking place in infancy and early childhood. Lesions of the adult type of tuberculosis tend to spread and cavitate, whereas infiltrations resulting from initial tuberculous infections tend to recede and calcify. The prognosis is grave for the adult type of tuberculosis. This type of the disease frequently results in death, whereas primary infections are seldom fatal. The relationship existing between the childhood and the adult type of tuberculosis seems to consist largely in the tendency for the primary infection to prepare the patient for the development of phthisis, should he perchance later experience a reinfection of sufficient severity to produce an intrapulmonary lesion. Phthisis apparently does not customarily result from a lighting up of an old infection received in childhood. The part that the former childhood infection seems to play in favoring the later development of phthisis seems to depend more upon the changes which this primary infection caused with respect to the manner in which the body afterward reacts to the tubercle bacillus and its products, rather than upon a lighting-up of the old disease acquired during childhood.—*The Evolution of Tuberculosis in the Human Lung, C. A. Stewart, Am. J. Med. Sc., March, 1933, clxxxv, 346.—(W. I. W.)*

Important Forms of Pulmonary Tuberculosis.—For several years several classifications of pulmonary tuberculosis have been in use, so that the nonspecialist has difficulty in establishing a practical orientation. Divisions into immunobiological groups are uncertain because pulmonary tuberculosis may also present a mechanical problem. For this reason the Ranke system cannot be the basis for the practical clinical investigation of tuberculosis, especially since the separation of the second and third stages is very often not possible. Neither is the differentiation into exudative, productive and cirrhotic processes satisfactory, as often they cannot be separated definitely by roentgenological or physical examination. Recently a more neutral designation, such as "infiltrations" or "spreads," has been advanced, but this is a backward step in the direction of the obsolete Turban-Gerhardt scheme which designates only the extent of a given lesion. A "qualitative diagnosis" is still the only one which allows a practical separation into main groups. The idea is to utilize only such changes of tissue that are bound up with certain clinical characteristics as to course and prognosis, and which may be ascertained by means of the usual clinical methods of examination. Thus one might have three main groups. The first group is characterized by softening and destruction of the pulmonary tissue, that is, *sequestrating tuberculosis*. The second group is characterized by induration and scar-formation, *indurating pulmonary tuberculosis*. It is obvious that these two groups may also occur together, but one or the other is usually predominant. The third group comprises cases in which there is no sign of induration or sequestration and which is called *infiltrating tuberculosis*. It may be considered as a group by itself or as a precursor of the other two groups. In the last group there is no softening, sequestrating or indurating processes as evidenced by X-ray or physical examination; and there are no tubercle bacilli or only a few occasionally. The X-ray usually shows multiple foci; the temperature is usually normal or subfebrile, the general health good, and the onset insidious. Infiltrating tuberculosis may completely absorb, or remain stationary, or soften and sequestrate. The second type is favorable if treated properly with rest. The first type consists of sequestration and infiltration. These patients have cavities; sputum is nearly always persistently positive; the course is rapid and unfavorable. The indurative type is characterized by calcification and scar-formation, and the prognosis is favorable. Physical signs are usually characteristic; the general condition of the patient is fair to good; sputum is negative and temperature normal; lymphocytosis is present; therapy is conservative. A combination of groups 1 and 2 occurs. In these, X-ray shows cavitation with dense walls; the clinical course is protracted; the sputum nearly always positive. There is constant danger of a spread. Toxic symptoms are usually marked, and cachexia and amyloidosis frequent. Collapse therapy is indicated.—*Die praktisch wichtigen Formen der Lungentuberkulose, W. W. Siebert, Deutsche med. Wchnschr., April 28, 1933, lix, 643.—(H. S. W.)*

Chronic Pulmonary Tuberculosis.—This new conception of chronic pulmonary tuberculosis offers a working hypothesis for the explanation of certain clinical phenomena. It is based on 7 postulates founded on the accepted research work published during the last twenty years. *1:* That after the first infection of the human body, with its resulting "primary focus," the early lesion of the adult type of chronic pulmonary tuberculosis is due to a haematogenous deposit of bacilli obtained from the lymphatic system. This manifestation is accompanied by a local allergic tissue reaction. This is a *secondary lesion. 2:* That the duration of this lesion in its pure state is very short and that by the end of this time its fate is determined. It either disappears, leaving a negligible scar, or undergoes changes, becoming an *intermediate lesion. 3:* That the life of the intermediate lesion is indeterminate, depending on the diathetic condition of its host, his health at the time, and his environmental conditions. It either remains as an intermediate lesion, spreading by direct extension or remaining dormant but unhealed, or heals decisively. In its healing it may either form a scar with no activity, or may contain somewhere in its interstices small areas of intermediate lesion. *4:* That the intermediate lesion, healed as far as it may and in a nonprogressive state, is a *tertiary lesion. 5:* That pure tertiary lesions do not spread. Apparently pure ones by virtue of the intermediate elements that they contain may spread slowly. *6:* That tertiary and intermediate lesions may become secondarily infected. *7:* That spread of disease results from a new haematogenous secondary lesion, a spread of an intermediate lesion by direct extension, a rapid bronchogenic spread in terminal states, after haemoptysis, and under anaesthesia. Secondary and intermediate lesions should be treated by rest. The sanatorium should be educational in its function. It affords no specific protection for the future. The pure tertiary lesion, or the cavitated, or the secondarily infected tertiary lesion should be treated on its merits. After a short period of observation to determine that no appreciable intermediate element is present, the case is essentially one for home, hospital, symptomatic or climatic treatment. The patient must be taught to realize his limitations. Tertiary lesions containing large intermediate elements must be treated as pure secondary or intermediate lesions. Collapse therapy may be used to prevent spread of intermediate lesions and to remove dangerous or unpleasant symptoms of tertiary lesions. However, it will afford no protection against the recurrence of fresh secondary lesions in the future. Recurrences are due to the sensitiveness of individuals to tuberculosis. They may be rendered insensitive by the injection of tubercle-bacillus vaccine given in conservative doses. Secondary lesions usually occur within two years of one another. Therefore, patients whose X-rays and histories demonstrate prolonged freedom from secondary lesions would be exempt from this immunizing treatment. Inasmuch as vaccine therapy has failed almost completely as a curative agent in infectious disease but has been very successful as a protective agent, the tubercle-bacillus vaccine offers a distinct hope that it may find a real place in our scheme of treatment.—*Chronic Pulmonary Tuberculosis: a New Conception, R. C. Wingfield, Brit. M. J., February 4, 1933, no. 3761, 179.*—(*T. O. R.*)

Atypical Pulmonary Tuberculosis.—Certain patients with pulmonary tuberculosis showed clinical and roentgenological characteristics which deviated markedly from the usual findings. Their chief characteristics are as follows: They all had swollen hilar lymph nodes. The pulmonary involvement was usually bilateral; auscultation did not detect any abnormal signs, and the percussion sound was normal, with the exception of impairment in the hilar region. The sputum was scanty and without tubercle bacilli. The foci did not excavate, and the general well-being was little affected. There was slight or no rise in temperature. Numerous extrapulmonary tuberculous foci occurred and indicated, in accordance with the roentgenological findings, haematogenous spread. Red cells and haemoglobin were normal or above normal. The leucocyte count was between 3,000 and 6,000, and there was 3 to 7 per cent, or more, eosinophiles. Five such cases have been observed and are reported in some detail. The parenchymal lesions show roentgenologically diffuse fibrosis. In the 5 cases, the following complications were observed: erythema nodosum (4), lymph-node swellings in addition to the hilar nodes (4), swelling of the salivary glands (2), cystic tuberculosis of the phalanges (1), lupus (1), tuberculous iritis (1). This type of case is probably best explained as being due to haematogenous spread with interstitial localization.—*Eine seltene Verlaufsform von hochgradig produktiver Lungentuberkulose mit negativem Bacillenbefund, G. Kohlmann, Beitr. z. Klin. d. Tuberk., February, 1933, lxxxii, 220.*—(*M. P.*)

Epituberculosis.—This condition of the lungs of children, which was first described in

1920 and 1921 by Eliasberg and Neuland, is discussed and a case is reported indicating its aetiology. Characteristics of epituberculosis are (1) the young age of the child; (2) absence of symptoms except unproductive cough; (3) absence of tubercle bacilli from the sputum and faeces; (4) positive reaction to tuberculin; (5) limitation to the upper lobe of physical signs which consist of dulness, increased vocal resonance and bronchial breath-sounds; (6) a roentgenogram with a homogeneous shadow extending from the hilum to the parietal pleura, filling the apex and having a clear-cut lower margin corresponding to the interlobar pleura; and (7) recovery with disappearance of the lesion and the physical signs. Eliasberg and Neuland and others have suggested that the pathological condition is a nonspecific, allergic, gelatinous pneumonia. They noted the existence of other evidence of tuberculosis and of enlarged mediastinal nodes, but suggested no interrelationship. Prosoroff suggests, on the basis of the roentgenographic appearance, that the condition is atelectasis due to obstruction of a bronchus by an enlarged node. Furthermore, the age-group is that in which hilum-node enlargement is most common, and the mode of recovery favors atelectasis rather than resolution. The case reported is that of a boy, aged fourteen years, ill three months with anorexia, loss of weight, unproductive cough and night-sweats. There was a family history of tuberculosis, but no history of contact with it. Characteristic physical findings and roentgenograms indicated the presence of a lesion in the right upper lobe with evidence of enlargement of the hilum nodes. Both sputum and faeces were negative for tubercle bacilli, but the intracutaneous test was positive. Bronchoscopy revealed slight deflection of the carina, and a tumor was seen pressing into the lumen of the right upper-lobe bronchus at its opening into the main bronchus. The mucous membranes were normal except for the presence of black pigmentation over the tumor. A section of the tumor consisted of tuberculous granulation-tissue and lymphatic tissue. A roentgenogram four days later showed partial clearing of the lesion; two weeks later occlusion again occurred, and three weeks later the apex had cleared. Necropsies are rare in this condition, but in the 2 cases recorded in the literature enlarged hilum nodes were found. It is concluded that epituberculosis is in reality atelectasis caused by enlarged hilum nodes. Illustrative roentgenograms are reproduced.—*Epituberculosis, a Query as to the Entity of this Condition, H. V. Morlock and A. J. S. Pinchin, Lancet, May 27, 1933, ccxxiv, 1114.*—(*R. M. F.*)

Haematogenous Foci and Progressive Tuberculosis of Lung.—It is well recognized that multiple and usually bilateral haematogenous foci occur frequently in children, particularly in the apices or in the upper parts of the lung. It is assumed that if they occur during the primary phase that they heal as the primary focus does, that is, by calcification and without perifocal inflammation. If they occur later, they have a tendency to circumfocal inflammation which may not subside for a long time. Sixty-four patients with such lesions were observed over a number of years. Twelve of them had small foci embedded in normal appearing parenchyma. Fifty-two of them had foci with perifocal clouding. Of the former group, none developed progressive lesions. Of the latter group, 48 per cent showed progression. It is concluded that haematogenous apical foci which show perifocal infiltration, need most careful medical supervision, because they are quite likely to develop into progressive pulmonay tuberculosis.—*Die hämatogenen Spitzen- und Oberfeldherde beim Kinde und Jugendlichen und ihre Bedeutung für die fortschreitende Lungentuberkulose, T. Plieninger, Beitr. z. Klin. d. Tuberk., March, 1933, lxxxii, 290.*—(*M. P.*)

Leichentubercle Followed by Generalized Tuberculosis.—This discussion is not only concerned with the typical "Leichentubercle" but it includes as well more violent and deeper trauma. The clinical and pathological consequences of superficial trauma, the typical "Leichentubercle" are well known and do not require further discussion. Here only the greater injuries are discussed, and only those that caused lesions beyond the local trauma. The material on which this discussion is based is an inquiry directed to many pathological institutes and tuberculosis hospitals. There is a longish discussion about the expected and actual differences depending on the presence of a primary infection. This is followed by detailed discussions of more or less completely observed cases. It is pointed out that in the majority of these cases large lesions occurred and that metastatic foci developed with or without a demonstrable infection of the draining lymph nodes. There is no doubt that frequently pulmonary metastases are detected much too late because roentgenograms are made too late. It must be kept in mind too that an exogenous reinfection may cause an exacerbation of a previously quiescent tuberculosis. This latter occurrence is frequently prognostically malignant, and it is warned to attack the local lesion with a knife because the consequence is frequently a rapid dissemination. It is finally emphasized how

important it is to have frequent roentgenological controls after a trauma has occurred. —*Über Leichentuberkel und Sektionsverletzungen mit nachfolgender tuberkulöser Allgemeinerkrankung, J. Hein, Beitr. z. Klin. d. Tuberk., May 22, 1933, lxxxii, 682.*—(*M. P.*)

Transitory Pulmonary Infiltrations.—It is now known that, by liquefaction, infiltrations can rapidly lead to progressive, cavernous tuberculosis or can rapidly resolve. The author presents the literature and discusses the transient, resolving infiltrations which so far as they are of tuberculous origin have been variously named: collateral inflammation (Tendeloo), perifocal inflammation (Schmincke), epituberculosis (Eliasberg and Neuland), paratuberculosis (Engel), secondary infiltration (Redeker), and even the early infiltrations (Redeker) are susceptible of resolution. Because of their rapid resolution, Huebschmann questions their specificity. The author presents two interesting cases with roentgenographs; the one nonspecific and the second a possible specific one. The differential diagnosis is thoroughly considered and is admittedly difficult, but negative sputum, negative tuberculin reaction and occurrence of a nonspecific infection indicate a nontuberculous nature, possibly a symptom-deficient, atypical pneumonia, yet a tuberculous secondary infiltration or early infiltrate cannot be definitely excluded. In these cases there exists a high allergic reaction which the associated eosinophilia occurring with these infiltrations suggests but do not conclusively verify. The infiltrations are more frequently observed roentgenologically.—*Über flüchtige Lungeninfiltrate, J. Leitner, Ztschr. f. Tuberk., 1932, lxvi, 226.*—(*H. J. C.*)

Tuberculous Cavities.—Complete and early closure of pulmonary cavities excreting tubercle bacilli is imperative, as there is continual danger of haemorrhage, spread by extension, aspiration pneumonia and visceral degeneration. Young cavities, usually silent, are not detectable by physical signs. Serial roentgenograms are essential. Extremes of young and old cavities are often recognizable through serial roentgenograms and clinical studies. Pleural adhesions and rigid cavities may often be forestalled, and thus render selective collapse more frequently possible. The extent and nature of the pathological changes of pulmonary tuberculosis that surround and accompany the cavity influence the prognosis more than the cavity itself. Young cavities of medium size surrounded by little disease disappear in 50 per cent or more of patients on strict bed-rest. Likewise, cavities without classification of age can heal in 40 per cent of patients under more prolonged bed-rest. The age of the patient, the age, size and number of cavities, the location, the drainage, the pleural adhesions and the fixation of the mediastinum and diaphragm have an important bearing on the outlook. Sixty-five per cent of patients with cavities are still living at the end of five years. Old upper-lobe cavities with good drainage, especially in elderly patients, are consistent with prolonged life. Indications for collapse therapy in the case of an old inactive cavity with little drainage and few bacilli differ from those of progressive activity, with much sputum, abundant elastic fibres and many bacilli. Pneumothorax is almost always indicated before an attempt is made at more radical surgery. It accomplishes economic recovery in from 40 to 50 per cent of patients receiving it under the usual indications. Eighty per cent of patients with cavities closed, symptom-free and sputum negative, as a result of satisfactory collapse of the lung, regain complete working capacity; those with cavities uncollapsed and sputum positive rarely make an economic recovery. Cavities collapsed and with negative sputum for two years are quite free from the danger of reactivation on reëxpansion of the lung. Collapsing of acute caseous pneumonia, within the first few days after the onset, often forestalls the development of pleural adhesions and at times the usual succeeding hollowing-out process of cavity-formation. Intrapleural pneumolysis or cauterization of pleural adhesions, string-like, band-like or finger-like in nature, will increase the number of collapses of cavities otherwise unsuccessful by 10 per cent. Phrenic-nerve operations may diminish the size of and obliterate cavities that otherwise resist artificial pneumothorax. Unaccompanied by other measures, they will, as a rule, completely obliterate only the younger cavities with little surrounding disease; the older ones, with the usual surrounding fibrosis, often become smaller, but rarely close. Combined with scaleniotomy, phrenicectomy will often close more cavities of small size, but rarely so if they extend below the second rib. Repeated crushings of the phrenic are employed to avoid sacrificing uninvolved lung. Oleothorax is at times indicated before thoracoplasty, in an attempt to close cavities present in an adherent or reëxpanding lung. Total posterolateral thoracoplasty is a method of radical surgery, most efficient for collapsing old resistant or adherent cavities. Old "giant" cavities, usually situated in the upper lobe and adherent, almost never collapse with pneumothorax and rarely with total posterolateral

thoracoplasty. They generally require supplementary operations, such as anterolateral rib removal, parasternal chondrectomy, secondary posterolateral thoracoplasty, or extrapleural pneumolysis with paraffine, pectoral muscle or rubber-bag filling. Uncollapsed cavities near the mediastinum usually require supplementary rib operations and pneumolysis with packing in the vertebral gutter. Partial thoracoplasty is worthy of trial in many cases of localized disease with cavities not too large, as well as in carefully selected bilateral tuberculosis. Deep and broad chests appear to resist closure of cavities by surgical-collapse therapy, whereas thin, narrow chests, with sloping shoulders, seem to collapse more readily. Extrapleural pneumolysis may suffice to close cavities, that are not too superficial and not too caseous to perforate, and whose walls are not too rigid and resistant. It is a less shocking operation, and therefore suitable, when indicated, for bilateral disease.—*The Cavity in the Tuberculous: Its Management, E. Mayer, J. Am. M. Ass., May 13, 1933, c, 1478.*—(*G. L. L.*)

Healing of Cavities.—A detailed study was made of 296 cases of pulmonary tuberculosis with cavity (464 cavities) at Loomis Sanatorium. Divided according to extent of excavation, there were 23.6 per cent with cavity not over 2 by 2 cm. in diameter, 20.1 per cent 3 by 3 cm., 21.6 per cent 4 by 4 cm., and 34.4 per cent over 4 by 4 cm. Of the 296 cases, 22 per cent secured spontaneous closure of cavity, the criteria for which were (1) sputum negative on concentration for at least 3 consecutive months, and (2) the cavity no longer visible by X-ray. The chance for spontaneous healing was inversely proportional to the size of the cavity, for closure was secured in 40 per cent of cavities not over 2 by 2 cm., 20 per cent of those 3 by 3 cm., 13 per cent of those 4 by 4 cm., and 6 per cent of those over 4 by 4 cm. When the infiltration surrounding a cavity was slight, the percentage of spontaneous closure was higher for cavities of all sizes. The heavier the surrounding infiltration, the less was the chance for closure to a minimum of less than half the average for cavities with heavy surrounding infiltration. Similar relations were noted in considering the thickness of the cavity-wall, for thin-walled cavities of all sizes, especially with slight surrounding infiltration, did better than the average, and the thicker the cavity-wall the poorer the chance for healing to a minimum of 5 per cent for thick-walled cavities. Central location gave twice as good a healing prognosis as peripheral, that is, close to the parietal pleura. Right-sided cavities in this series had twice the percentage of spontaneous closure of left-sided and three times that of bilateral cavities. The age-group from 15 to 25 years did only about 50 to 75 per cent as well as the average in spontaneous healing, and had a large number of unimproved (45 per cent compared with 25 per cent average). In girls under 20 years, only about half (11 per cent) of the average secured spontaneous closure and the percentage of unimproved was 64. Over 45 years there was a high percentage of unimproved (40 per cent). Gain in body-weight proved to be an unreliable index of healing, since 60 per cent of the unimproved gained weight. The incidence of spread of the disease in the whole group, which included many hopeless cases, was 24 per cent. In the group that received collapse therapy in less than two months after admission the incidence of spread was the same. Classification was first made on the basis of results of bed-rest treatment alone, except for the group receiving early-collapse therapy, which comprised 22 per cent of the 296 cases. Of the remainder of the series who received two months or more of routine rest treatment and who may or may not have subsequently received collapse therapy, 22 per cent secured spontaneous closure of cavity, 13 per cent were much improved (cavity reduced to a remnant, sputum positive or negative), 15 per cent were slightly improved, and 28 per cent were unimproved (cavity the same or larger). Sixty-five per cent of the unimproved, 50 per cent of the slightly improved, and 7 per cent of the much improved subsequently received collapse therapy, and together constituted 27 per cent of the 296 cases. Thus, a total of 49 per cent of the group received some form or combination of forms of collapse therapy, and roughly one-third, or 17 per cent, secured cavity closure thereby. Finally, using all forms of treatment, in 296 cases with cavity, an excellent result was obtained in 39 per cent (cavity closed), and a good result in an additional 25 per cent (cavity much improved). From the above findings the necessity for individualization in the treatment of pulmonary tuberculosis with cavity is demonstrated. The presence of cavity undoubtedly constitutes a serious menace, but before instituting collapse therapy all factors should be carefully weighed, and if they are not highly unfavorable, a preliminary period of observation with the patient at bed rest is fully justified. The danger of spread of the disease during such a period and under such conditions has, except in acute cases, been overemphasized. Furthermore, collapse therapy does not entirely eliminate this danger, as is shown by the fact that the group receiving early collapse had a 25 per

cent incidence of spread after collapse, compared with 24 per cent incidence for the group as a whole, which contained many hopeless cases.—*The Healing of Tuberculous Cavities: a Clinical Study, B. T. McMahon and E. H. Kerper, Am. J. M. Sc., August, 1933, clxxxvi, 170.*—(*W. I. W.*)

Healing in Pulmonary Tuberculosis.—A clinical and experimental study of the interesting question as to why and how rest and collapse therapy cure pulmonary tuberculosis has been carried on for the past two years in the pulmonary tuberculosis services of Metropolitan and Sea View hospitals and in the Department of Surgical Research of Cornell Medical College. Acid-fast bacilli, in general, and more especially virulent human or bovine tubercle bacilli are not only strict aerobes but they need a large amount of oxygen for their continuation of life and growth. If cultures are deprived of oxygen, the respiratory metabolism of the bacilli falls to zero within from six to eight days. These facts have great clinical importance. If for any reason conditions of anaerobiosis are created in a tuberculous area of the lung or of any other organ, tubercle bacilli could not continue to thrive and grow. The lesion will remain stationary and then regress; the amount of bacilli and their toxic products will rapidly decrease. The author has shown that, when a large bronchus is obstructed, the air entrapped in the territory of the lung corresponding to that bronchus will be completely absorbed. This is also indicated by the development in the atelectatic portions of the lung of strict anaerobes, as in the case of experimental putrid abscess of the lung. It is well known that pulmonary tuberculosis is accompanied by early and marked bronchial lesions. Every one of them, exudative, caseous or proliferative, may produce bronchial obstruction leading to atelectasis. It has been proved beyond doubt that the majority of so-called fibrotic lungs really are or have been atelectatic lungs. The importance of the "draining bronchus" of the tuberculous cavity, completely overlooked thus far, is of paramount importance. It explains the peculiarly spherical form of the cavities in the living individuals, whereas at autopsy they are irregular in shape. These "draining bronchi" have a great bearing on the evolution of the cavity. Three courses may be followed by these outlets; first, they may remain open; second, because of pathological narrowing of their lumina they may allow ingress of air during inspiration and prevent egress during expiration, producing a one-way-valve mechanism; third, they may become obstructed. In the first case, the number of bacilli in the sputum is considerable and the danger of spreading is always present. Gas analyses, made on air-specimens taken by puncture through the chest-wall, showed that the air contained in these cavities has a composition almost identical with that of bronchial air (oxygen, 17 per cent; carbon dioxide, 0.7 per cent). In the second event, when a one-way-valve mechanism is produced, the cavity increases rapidly in size, and the pressure within it becomes positive (+3 cm. of water in one case); the percentage of oxygen decreases (15 per cent) and the amount of carbon dioxide increases (2.5 per cent). In the third, when the "draining bronchus" of the cavity becomes obstructed, the air contained in the cavity will be absorbed and the walls of the cavity will collapse. This conception probably explains the occasional spontaneous disappearance of cavities and more especially their collapse and cure after successful pneumothorax or thoracoplasty. Thoracoplasty, which cannot obliterate more than two-thirds of the chest cavity probably acts by collapsing and "kinking" the bronchial outlets of the cavities and thus producing their closure. This is shown by the rapid disappearance of bacilli in the sputum after a successful pneumothorax or thoracoplasty. A last point is the relation between tissue anoxaemia (always present in atelectasis) and fibrosis. It is generally considered to-day that tuberculosis is essentially a disease of the connective tissue. There is an active deposition of embryonic connective-tissue cells around the tubercle bacilli. Another characteristic of tuberculous tissue is that it is avascular. These two conditions are particularly favorable for the formation of fibrous tissue, especially when the amount of oxygen brought to the surrounding parenchyma is decreased or altogether suppressed. This would explain the well-known but heretofore puzzling fact that tuberculosis, more than any other disease, leads to fibrosis and that it tends to spontaneous cure by this mechanism, especially when in the affected organs circulatory activity is diminished, as by rest and immobilization.—*How Do Rest and Collapse Treatment Cure Pulmonary Tuberculosis?, P. N. Coryllos, J. Am. M. Ass., February 18, 1933, c, 480.*—(*G. L. L.*)

Healing of Pulmonary Tuberculosis in Aged.—In an earlier study (*Med. Klin., 1931, no. 44*) the authors pointed out that pulmonary tuberculosis in the aged, beyond 60 years, can heal. The authors present their cases in four categories concerning findings in the upper pulmonary areas. *1:* Cases in which bacilli were undoubtedly found after the 60th year and which then disappeared; clinical and roentgenological find-

ings remain more or less unchanged and autopsy revealed healed tuberculosis. *2:* Cases clinically questioned, and later verified anatomically that pulmonary tuberculosis had existed; around the healed foci nonspecific processes of various type and size developed *3:* Cases in which neither clinically nor anatomically a previous pulmonary tuberculosis was determinable; for some reason nonspecific processes developed. Of these three groups only the first two were pertinent to the study. But since the clinical picture and the roentgen findings in all three are alike, and differentiation on aetiological basis is not always possible, examples of all three are presented. If bacilli were not found in the sputum, no definite clinical differentiation could be arrived at, whether the nonspecific foci developed primarily or secondarily in conclusion to healed tuberculosis. The fourth group was presented as a datum of medical practice, and consisted of cases in which, in the aged, (a) tuberculosis developed, (b) an old tuberculosis flared up, and (c) contrary to clinical opinion, autopsy revealed tuberculosis.—*Die Heilbarkeit der Lungentuberkulose im Alter, L. Dünner, F. Leeser and M. H. Corten, Ztschr. f. Tuberk., 1932, lxvi, 12.*—(*H. J. C.*)

Retention of Dye in Inflamed Areas.—In a previous paper it was shown that foreign materials injected into an acutely inflamed area are fixed *in situ* and fail to disseminate readily to the tributary lymphatic nodes. This phenomenon is believed to be due to the presence of mechanical obstruction in the form both of a fibrinous network and of thrombosed lymphatics at the site of inflammation. The foreign substances studied included, among others, trypan-blue and bacteria. When a vital dye is introduced into an area at various intervals of time after bacterial inoculation of this site, the degree of walling-off of the infected focus may be determined by the extent to which the dye can drain into the regional lymphatics. In the present article the rapidity of fixation of a vital dye (trypan-blue) injected into inflammatory foci set up by different bacteria (*Staphylococcus aureus, Streptococcus haemolyticus, and Pneumococcus,* type I) is reported in a study of the invasive properties of these three microörganisms. The procedure was to inject the organisms into the skin of the foreleg of a series of rabbits. Either immediately following this injection or after varying intervals of time, 2.5 cc. of a 1 per cent solution of trypan-blue in physiological salt solution was injected into the inflamed area. The same amount of dye was introduced into the other foreleg to serve as a control. Both the lymph from the efferent vessel of the axillary lymphatic nodes, and the nodes themselves were studied for the presence of the dye. Trypan-blue injected into an inflamed area induced by *Staphylococcus aureus* failed to drain readily to the tributary lymphatics, when the dye was injected as early as one hour after the inoculation of the microörganisms. When introduced into an area of cutaneous inflammation induced by *Pneumococcus,* type I, the trypan-blue was not retained *in situ* until it was injected about six or more hours after the inoculation of the bacteria. When the inflamed area was induced by *Streptococcus haemolyticus,* trypan-blue injected into it drained readily to the tributary lymphatics for the first thirty hours. When the inflammation had lasted forty-five hours or longer, the dye was fixed *in situ* and failed in most instances to reach the tributary lymphatics. Inasmuch as staphylococci, pneumococci and streptococci spread from the site of cutaneous inoculation primarily through lymphatic channels, the difference in the rapidity with which mechanical obstruction is set up in the areas inflamed by them, as evidenced by the fixation of trypan-blue, will help to explain the differing invasive abilities of these pyogenic organisms. From histological studies of the inflamed areas, the mechanical obstruction appeared to be due to the formation of both a fibrinous network and the thrombosing of the lymphatics at the site of inflammation.—*Studies on Inflammation. IX. A Factor in the Mechanism of Invasiveness by Pyogenic Bacteria, V. Menkin, J. Exper. Med., June 1, 1933, lvii, 977.*—(*J. S. W.*)

Pathogenesis of Miliary Tuberculosis.—The clinical records and the autopsy findings of 39 cases of miliary tuberculosis were studied. Histological examinations made it highly probable that endovascular tubercles, as maintained by Weigert, are not the cause but the result of haematogenous propagation. According to Loeschke, the focus responsible for the acute spread must fulfil the following requirements: It must contain a large number of bacilli, it must be liquefied, and it must have broken into the blood-vessel. At the time of the rupture, blood usually enters the tuberculous focus and is demonstrable in it unless the rupture occurred a sufficiently long time before death to permit complete resorption of the blood. In 31 to 39 cases, such foci were demonstrated very clearly. In the other 8 cases, it was not possible to determine the source of the haematogenous seeding with absolute certainty. The focus was in lymph nodes in 22 cases, it was the primary focus in 13 cases, a caseated testis in one case, and in 3 cases no focus responsible for the seeding could be found.—*Zur Frage*

der Entstehung der akuten allgemeinen Miliärtuberkulose, I. Minguez, Beitr. z. Klin d. Tuberk., January, 1933, lxxxii, 84.—(M. P.)

Spread of Tuberculosis from Calcareous Foci.—It is generally recognized that the pulmonary primary lesion is the outcome of an aerogenous infection with the tubercle bacillus. In order to discuss the primary affect as a propagation focus leading to chronic pulmonary phthisis, it is best to differentiate between caseous and calcareo-osseous primary affects. Propagation from caseous, fresh, primary affects are not rare in infants and children. The possible spread from old, calcareo-osseous primary affects is a question of considerable interest. The causal connection between an old primary affect and tuberculous foci in the lungs is possible only if they are locally separated, if there are no other calcareous foci in the lungs and no cavities, and if the regional lymph nodes are free from fresh tuberculous changes. In such cases it can usually be shown that so-called exogenous infections during the early period of the primary affect were the propagation foci for pulmonary exacerbations. Pulmonary exacerbations from old primary affects are rarely recorded in the literature. Extensive autopsy experience proves the occurrence of exacerbation of old calcareous-osseous primary affects. However, these are rare. The exacerbation of the old calcareo-osseous primary affect is as a rule confined to its capsule and the immediate surrounding pulmonary tissue. Two cases are reported in which old calcareo-osseous primary affects showed Langhans giant cells and tubercles (but not tubercle bacilli). It may be concluded that the old primary focus only very rarely plays the rôle of a propagating focus for pulmonary phthisis.—*Zur Entstehung der chronischen Lungentuberkulose durch Exazerbation alter pulmonaler Primärkomplexe, H. H. Kalbfleisch, Deutsche med. Wchnschr., March 10, 1933, lix, 357.—(H. S. W.)*

Calcification of Pleura.—After reviewing the literature of pleural calcifications, the authors refer to two types according to Endres: namely, (1) *calculosis pleural*, a rarity, and (2) *calcificatio pleural*, a more common form. Until recently, pleural calcifications were rarely diagnosed *in vivo*, but with improvement in X-ray technique the condition offers less diagnostic difficulty, although knowledge regarding its aetiology and pathogenesis leaves much to be desired. Thirteen cases were observed among thousands of examinations: 3 were related to gun-shot injuries; 3 were pleuritis of many years' duration; 2 were without relation to pulmonary or pleural processes; and there were 1 case of pulmonary tuberculosis with cavities and bacillary sputum, 1 with tuberculosis of the shoulder joint but no pulmonary or costal pleural disease, 1 of repeated pneumonia in youth and vascular sclerosis, 1 with calcified interlobitis, and 1 with pleuritis in 1921 and dispensary treatment for pulmonary tuberculosis since 1927. All cases were between 30 to 60 years, 11 being men and 2 women. Since all pleural conditions do not result in calcification, there must therefore be other essential determining items, such as endocrine disturbances, those of metabolism, etc. Any explanation based on the constitutional factor is inadequate.—*Zur Frage der Pleuraverkalkung, I. Odessky and I. Klioner, Ztschr. f. Tuberk., 1932, lxvi, 136.—(H. J. C.)*

Experimental Pleural Adhesions.—In operations upon lung abscess it is important that the pleural surfaces in the field of operation be adherent; otherwise there is grave danger of severe empyema. Various procedures have been used to produce pleural adhesions. Experiments on dogs showed that chemical irritants, applied extrapleurally, could not be depended upon to produce adhesions, and often produced excessive inflammatory reactions. The application of extrapleural pressure, by stripping the parietal pleura from the ribs and packing with gauze, produced a fibrinous exudate between the pleural surfaces, due apparently to damage to the pleural cells. The exudate became organized in from 5 to 7 days. With this procedure there was little concomitant reaction in the underlying lung.—*Experimental Pleural Adhesions, S. Hirshfeld, J. Cohen and A. P. Stout, Arch. Surg., May, 1933, xxvi, 892.—(R. D.)*

Intrapleural Formation of Fibrinous Bodies.—The formation of fibrinous bodies in artificial-pneumothorax spaces is a matter of little practical importance, since it is a very rare complication that introduces no additional hazard and in no way mitigates the result. The phenomenon is of theoretical interest, however, because of its bizarre roentgenological appearance and because, since Fleischner first described its occurrence in 1922, its pathogenesis has been a matter of much speculation. A case is reported in which the formation of a mobile fibrinous ball by the massive coagulation and retraction of a small pleural exudate was observed roentgenologically.—*Sur la formation de corps fibrineux dans la cavité du pneumothorax artificiel, C. Auguste, Rev. d. l. Tuberc., October, 1932, xiii, 821.—(A. E. M.)*

Origin of Epithelioid Cell in Tuberculosis.—Surrounded by capillaries, but normally avascular itself, the cornea is an ideal site in which to study the movements and focalizations of wandering leucocytes. In a previous study (see above) it was shown that the injection of tubercle bacilli in the cornea of rabbits and other animals is followed by an accumulation, first, of polymorphonuclear neutrophilic leucocytes around the bacilli, and then of large mononuclear wandering cells which engulf and replace the leucocytes. It seemed significant that the arrival of the large mononuclear cells approximately coincided with the appearance of capillaries in the injured, avascular area. This observation made it seem probable that the large mononuclear cells, which ultimately gave rise to epithelioid cells, came either from the blood-stream directly, or from the walls of new ingrowing blood-vessels and not from local fixed-tissue cells of the cornea. In order to test this hypothesis an experiment was devised for comparing the development of tuberculous areas in the same eye (cornea), but respectively near and far from the original blood-supply. It seemed probable that if the source of the epithelioid cells was the vascular system a region of infection near the limbus would become of epithelioid character more rapidly than one in the centre of the cornea. Accordingly, in each of a series of large rabbits, two infections with 0.01 mgm. human tubercle bacilli (H37), of low but still appreciable virulence for this animal, were introduced in the same cornea, one about 2 mm. from the limbus, the other in the centre or 5 to 6 mm. from the limbus. Animals were killed at 1, 6, 14 and 48 days. The infected eyes were fixed and embedded, and the blocks mounted in such a way that the plane of sectioning included the site of both infections and the intervening tissues. Three sets of sections were prepared, one stained with haemotoxylin-eosin; one with haematoxylin, carbol-fuchsin and orange-G; and one with eosinazure. By the second technique the tubercle bacilli and the granules of the polymorphonuclear leucocytes were well shown. The third technique was used in attempting to differentiate the mononuclear leucocytes. Results were as anticipated. The lesions consisted almost solely of polymorphonuclear leucocytes until the arrival of new capillaries; when a rapid replacement of the polymorphonuclears by mononuclear phagocytic cells occurred. This replacement occurred weeks earlier in the lesion close to the limbus. The mononuclears accounting for the replacement and functioning in the subsequent development of the lesion apparently arose from primitive smaller mononuclear cells present in large numbers in and around the walls of the new capillaries. The source of these cells could not be determined with absolute certainty, but the following observations were evidence that most of them came from the blood-stream: (a) cells of similar character were present among the erythrocytes in blood-vessel lumina in great excess of the normal proportion; (b) migration figures of similar cells could be seen in the walls of the growing capillaries; and (c) mitotic figures among them were rare. The primitive cells after accumulating in and around the capillary walls underwent a progressive transformation by simultaneous increase in size and change of character, without mitosis, into epithelioid cells. The process of the chronic tuberculous inflammatory reaction in the cornea seemed to be as follows: *1:* Vascularization of the infected region. *2:* Appearance of primitive mononuclear cells in (a) blood-vessel lumina and (b) blood-vessel walls. *3:* Appearance of primitive mononuclear cells in perivascular arrangement ("collars"). *4:* Transformation through several stages to similar cells radiating from the perivascular accumulations. *5:* Further transformation to typical epithelioid cells undergoing degeneration and necrosis in circumscribed areas. The new tissue thus appears to be made up of new blood-vessels and the perivascular nuclear cells and their derivatives. The perivascular cellular "collars" are evidently the source of all the new tissue outside of the blood-vessels.—*The Origin of the Epithelioid Cell in Experimental Tuberculosis of the Cornea, E. R. Long and S. W. Holley, Am. J. Path., May, 1930, ix, 337.*—(*J. S. W.*)

New Formation of Blood-Vessels and Tubercle Bacillaemia.—Tuberculous granulation tissue in the lung is usually richly vascularized by new-formed capillaries. Such capillaries contain frequently tubercle bacilli, either free or in phagocytes. This is one mechanism of the invasion of the blood-stream which may have considerable importance in the development of tuberculosis.—*Studie über die Gefässneubildung in den tuberkulösen Lungenveränderungen und ihre Bedeutung für die Bacilleninvasion ins Blut, J. A. Pascual, Beitr. z. Klin. d. Tuberk., February, 1933, lxxxii, 153.*—(*M. P.*)

Argentophilic Fibres in Primary Tuberculous Foci.—A number of primary complexes, parenchymal and lymph-node foci, were examined by silver impregnation. The demonstration of the argentophilic fibres gives a much more complete picture of the structure of the foci than other staining methods, and permits, to a certain degree, to

recognition of the evolution of the lesions. Comparing the development in the parenchymal and in the lymph-node focus, it is found that there exist certain differences. The specific granulation-tissue which forms in the periphery of the parenchymal foci leads usually to encapsulation and organization. The development of the parenchymal focus shows periods of exacerbations only rarely. In the lymph-node foci, however, exacerbations are much more frequent, and granulation-tissue is formed earlier.—*Über die argentophilen Faserstrukturen im tuberkulösen Lungenprimärkomplex bei Kindern, M. B. Ariel, Beitr. z. Klin. d. Tuberk., March, 1933, lxxxii, 341.*—(*M. P.*)

Nerves and Ganglia in Laryngeal and Pulmonary Tuberculosis.—Tuberculous changes in larynx and lung are associated with definite changes in the nerve tracts and ganglia. The most common findings are proliferative and inflammatory changes, which are evident as neuromata and affect the axis-cylinders. The changes may affect the entire extent of the fibres of the laryngeal and vagus nerves, and involve both fibres and nerve-cells.—*Über die pathologische Histologie der Nerven und Ganglion bei Kehlkopf- und Lungentuberkulose, A. G. Filatowa and B. J. Lawrentjew, Virchows Archiv path. Anat., 1932, cclxxxvi, 1.*—(*H. J. C.*)

Tests for Respiratory Efficiency.—The so called "dead space" of the respiratory apparatus should be regarded as a physiological entity. The material point is the proportion of each breath which fails to enter the actual alveolar ventilation. The volume of the upper respiratory passages and the anatomical dilatation of the bronchi are probably less important factors than the questions of axial and peripheral streams of air and the degree of penetration of the air into the alveoli. The problem was attacked by using a closed-circuit recording spirometer devised to measure the volume of oxygen consumed, to permit of determining the volume of carbon dioxide formed, to allow sampling of the expired air, and to record the volume of the respirations and maximum inspiration and expiration. The determination of the carbon-dioxide content of samples of alveolar air, taken after an expiration of at least 500 cc., during the middle of a 7-minute period of observation, permitted the calculation of the dead space. This entity is best represented as percentage of the tidal air. In normal subjects at rest it is about 30 per cent. The figure falls slightly on exercise, though Douglas and Haldane have shown that in terms of volume the dead space rises from 160 cc. at rest to as much as 600 cc. on exercise. In 15 patients on whom satisfactory readings were obtained the dead space exceeded 40 per cent in five. *1:* A case of spontaneous pneumothorax had a dead-space value of 65 per cent of the tidal air. The inefficiency of his ventilation was confirmed by his "ventilation equivalent for oxygen" (the amount of air which must be breathed in order that 100 cc. of oxygen may be obtained by the body), which was 4 litres instead of the normal figure of 2.5 litres. *2:* A second case of spontaneous pneumothorax showed a dead space of 64 per cent of the tidal air. *3:* A partially reëxpanded spontaneous pneumothorax showed a dead space of 47 per cent. *4:* A case of neoplasm of the lung showed a dead space of 52 per cent. *5:* A patient suffering from asthma had a dead space of 62 per cent. The study of the dead space in relation to the tidal air reveals a type of inefficiency which may be hidden in determinations of the vital capacity, for it represents a functional rather than a structural failure. It is the alveolar ventilation which counts as far as gas exchange goes, but it is this plus the ventilation of the dead space which determines the work the bellows must perform.—*Tests for Respiratory Efficiency: the So-Called Dead Space, A. Moncrieff, Lancet, May 6, 1933, ccxxiv, 956.*—(*R. D.*)

Graphic Registration of Respiration.—The study of the movements or the changes in volume of the thorax is inadequate for the differentiation of types of respiration. A method was therefore devised for the measurement of the velocity of the air-stream and the study of the changes in the respiratory pressures under normal and pathological conditions. The apparatus which is described can be used at the bed-side as well as during exercise or work, and makes it possible to obtain curves of the respiratory movements without inconvenience to the patient and for any length of time. A number of curves illustrate various types of normal or pathological respiration, and the changes that can be observed after the administration of drugs, such as strophanthine, morphine or euphyllin.—*Ueber eine Methode zur fortlaufenden Atemregistrierung, H. Aldenhoven, Klin. Wchnschr., March 18, 1933, xli, 427.*—(*K. F.*)

Cardiac Function in Pulmonary Tuberculosis.—A photographic registration of the venous-pulse curve was performed in 220 patients with open pulmonary tuberculosis. Of these, only 2.3 per cent showed completely normal conditions; 58.2 per cent showed slight, 23.6 per cent moderate and 15.9 per cent marked deviation from normal.

In 110 patients with open pulmonary tuberculosis, blood-pressure and pulse were examined, and Kauffmann's water test was performed. The blood-pressure was slightly changed in 48.2 per cent and markedly in 20 per cent. Slight pulse anomalies were found in 65.5 per cent and marked ones in 20.9 per cent. Such functional tests of the circulatory system are particularly important before surgical interference.—*Herzfunktionsprüfungen bei Lungentuberkulösen, E. Witzenrath, Beitr. z. Klin. d. Tuberk., April, 1933, lxxxii, 585.*—(*M. P.*)

Pulmonary Tuberculosis and Circulation.—Practically all cases of pulmonary tuberculosis produce circulatory disturbances which increase, as a rule, with the duration of the disease and with its extent. The functional capacity of the circulation was tested in 142 patients. The tests applied were estimation of the blood-pressure at rest and after graded exercise, the behavior of the pulse-rate under the same conditions, and the diuresis in the so-called Kauffmann test. All of these tests showed a definite impairment of the circulatory function, the Kauffmann test being the finest indicator. Collapse therapy improves the circulatory impairment.—*Lungentuberkulose und Kreislauf, K. Raithel, Beitr. z. Klin. d. Tuberk., March, 1933, lxxxii, 438.*—(*M. P.*)

Pulmonary Tuberculosis and Circulation.—The author used *Decholin* (5 cc. 20 per cent sodium salt of dihydrocholic acid) injected intravenously, described by Winternitz, Deutsch and Brüll (*Med. Klin., 1931, xxvii, 986*) for determining the blood circulation time. In normal and mildly ill women and girls the readings were 10 to 16 seconds. The harmless injection was gauged for circulation time by the occurrence of a quickly disappearing bitter taste. A tabulation of 27 cases, 23 of which had bilateral pulmonary tuberculosis with marked tissue destruction, revealed no or only slight deviations from normal, and the findings varied from 11 to 18 seconds. A retardation was found in 2 cases of disseminated haematogenous disease (20 and 21 seconds). A retardation was found in a case of advanced bronchial carcinoma with exudate (22 seconds), while it was hastened in 2 cases of Basedow's disease complicating tuberculosis (8 and 9 seconds). In a second table are recorded 14 artificial-pneumothorax cases (some cases were studied before and after institution of pneumothorax), but no appreciable retardation was noted. As a rule phrenicoexairesis does not alter the circulation time. A case of thoracoplasty with new involvement on the opposite side revealed a retardation (22 seconds).—*Beitrag zur Frage "Lungentuberkulose und Kreislauf" Bestimmung der Blutumlaufzeit, F. Warnecke, Ztschr. f. Tuberk., 1933, lxviii, 7.*—(*H. J. C.*)

Venous Blood-Pressure in Pulmonary Tuberculosis.—In pulmonary tuberculosis there is a change in the venous blood-pressure (by the method given in *Verhandlungen der Deutsche Gesellsch. f. inn. Med., 1930, 334*) as contrasted with normal values. The change is in the nature of an increase in the venous blood-pressure, and this increase parallels the increase in blood-sedimentation rate. It is attributed in part to the toxaemia of pulmonary tuberculosis.—*Untersuchungen über den Venendruck bei Lungentuberkulose, R. Fischer, Ztschr. f. Tuberk., 1932, lxvi, 247.*—(*H. J. C.*)

Venous Blood-Pressure in Pulmonary Tuberculosis.—The majority of investigators believe that pulmonary tuberculosis influences the venous blood-pressure, and that from this diagnostic and prognostic conclusions can be drawn, especially as to the functional activity of the heart. A study of the venous pressure in 141 women with pulmonary tuberculosis gave variable findings. There was no relation between the venous pressure and the form of disease, the arterial blood-pressure, the pulse-frequency or other external bodily indications, and it bears no relation to operative possibilities. The results of venous blood-pressure measurements frequently contradict the entire clinical picture and do not present evidence regarding the functional ability of the heart.—*Messungen des Venendrucks bei Lungentuberkulose, E. Gabe, Ztschr. f. Tuberk., 1933, lxviii, 2.*—(*H. J. C.*)

Skin Vascular Pressure in Pulmonary Tuberculosis.—The pale dry skin seen in chronic cirrhotic phthisis, named the "dry disease," and the *Beaute phthisique* of the French, indicating the tuberculosis of puberty, with rose-red facial skin and glossy eyes, led to the study of the cutaneous blood-pressure with Herzog's method. The cases studied were divided into 3 groups: the first being of cirrhotic type, the second predominantly exudative, and the third mixed and proliferative. Cases with Basedow's disease, circulatory insufficiency, renal or arteriosclerotic conditions were excluded because they affect the vascular pressure of the skin. Measurements were taken at equable room temperatures and after rest periods. The hand was placed at the cardiac level. In all cases systolic pressure was also determined. Readings were also made after bathing and rubbing the arm. In the first type, there

occurred definitely increased pressures or those of about upper normal values, being increased by warm bathing and rubbing. In the second form, there was a diminution of the skin vascular pressure values and in some the pressure was at the lower normal levels. After warm baths and rubbing these further diminished. The third form showed intermediate values between the first two groups, and in the majority they were uninfluenced by warm bathing and rubbing, a few, however, showing a slight increase. The systolic pressure findings, like those obtained by Herzog in normal individuals, showed greater variations than the skin pressures. The difference between the systolic pressure and the skin pressure was individually variable but was not characteristic for any of the three groups. There was no parallelism between the red-cell count, after warm bathing and rubbing, and the skin pressure.—*Untersuchungen über den Hautgefässdruck bei Lungentuberkulose, Marie v. Barbarczy, Ztschr. f. Tuberk., 1932, lxvi, 142.*—(*H. J. C.*)

Position and Intrapleural Pressure.—It is well known that changing from the lying to the sitting position or *vice versa*, after a pneumothorax refill, may change the intrapleural pressure by several centimetres of water. This increase or decrease, as the case may be, is due in largest part to the increase or decrease of the pressure of the abdominal contents on the diaphragm. Attention is called to another factor. It is often customary in the presence of hemithoracic retraction, in order to obtain adequate separation of the ribs for greater ease in the insertion of the cannula, to place the patient in lateral decubitus on the sound side, and to place beneath this a sandbag or pillow, thus producing a curvature of the uppermost side of the thoracic cage. Simple considerations show that in this position the intrapleural space is increased. Hence, it was found that, on refilling an artificial pneumothorax, although the terminal pressures were negative or zero, on arising or removing the support, signs of compression and mediastinal deviation appeared, and remeasurement revealed positive pressures. Therefore it is important to bear this point in mind in measuring pressures in the arched position described.—*Variations de la pression intrapleurale au cours des réinsufflations suivant la position du sujet, Jeanne Stephani-Cherbuliez, Rev. d. l. Tuberc., December, 1932, xiii, 1018.*—(*A. E. M.*)

Electrical Conductivity of Blood-Serum in Pulmonary Tuberculosis.—This is the first of a series of investigations to determine the physicochemical differences in the blood between those patients who possess an immunity to pulmonary tuberculosis as shown by the healing of a lesion and those succumbing to the disease. It is well known that there is no significant difference in electrical conductivity of the sera of healthy persons or those with active or quiescent tuberculosis. It is here shown, however, that there are variations on diluting such sera. The procedure followed was to determine the conductivity of serum diluted 100 and 1,000 times by distilled water. Theoretically the ratio S/1,000 to S/100 should be 1/10. Patients with roentgenological tuberculosis but clinically healthy approached this very closely, the mean being 0.0996. Those who had healed a lesion under observation had a ratio 7 per cent in excess of this. Patients with advancing, active phthisis had a ratio 37 per cent in excess of 0.1. Without desiring at present to draw any conclusions, it is pointed out that these findings indicate a marked ionic instability of the blood serum in patients not in equilibrium with their disease.—*Influence de la dilution sur la conductivité électrique du sérum sanguin au cours de la tuberculose pulmonaire, F. Rimattei and C. Mattei, Rev. d. l. Tuberc., January, 1933, i, 33.*—(*A. E. M.*)

Serum Cholesterol in Tuberculosis.—Tuberculosis patients have usually lower cholesterol values than normal, although the cholesterol level does not parallel the activity or severity of the disease. The cholesterol content is largely dependent upon intake. Under a cholesterol-rich diet the cholesterol in the serum increases from 15 to 20 per cent in healthy people, and in tuberculosis patients from 100 to 170 per cent, an effect that becomes apparent only after several days of the cholesterol diet. Pure cholesterol added to a normal diet does not influence the serum-cholesterol. Following heavy doses of sesame oil the serum-cholesterol always increases in normal individuals, but in prognostically unfavorable tuberculosis patients this increase does not occur. The increase in serum-cholesterol following oil is due to the mobilization of endogenous cholesterol. It is still unknown which organ or organs control the cholesterol metabolism.—*Serum-Cholesterin-Untersuchungen bei Gesunden und Tuberkulösen, D. Szüle, Beitr. z. Klin. d. Tuberk., May 22, 1933, lxxxii, 727.*—(*M. P.*)

Pancreatic Extract and Serum Lipase.—Rabbits, infected with tubercle bacilli, showed regularly a decrease of serum lipase. If the infected rabbits are treated with pancreatic extract, the lipase does not decrease,

but usually increases.—*Die Verhinderung der Serumlipaseabnahme bei tuberkulösen Kaninchen, J. Baló, F. Gerlei and L. Lovas, Beitr. z. Klin. d. Tuberk., February, 1933, lxxxii, 164.*—(*M. P.*)

Uric-Acid Metabolism in Tuberculosis.—Twenty patients with pulmonary tuberculosis were examined in regard to their purin metabolism. They all showed a disturbance, as indicated by high uric-acid content of the blood, and relatively low uric-acid excretion. The degree of this metabolic disturbance depends on the extent and on the pathological anatomical character of the disease.—*Der Härnsäurestoffwechsel bei Lungentuberkulose, K. Becker, Beitr. z. Klin. d. Tuberk., March, 1933, lxxxii, 465.*—(*M. P.*)

Water and Chlorine Metabolism in Tuberculosis.—The organs of tuberculosis patients contain slightly more water and considerably less chlorine than normal. This condition is probably not specific for tuberculosis, but occurs in all wasting diseases. This biochemical deviation from normal would indicate that the salt-free diet advocated for tuberculosis is not justified.—*Untersuchungen über den Wasser- und Chlorbestand der Organe des tuberkulosekranken Menschen, W. Grünewald, Beitr. z. Klin. d. Tuberk., February, 1933, lxxxii, 189.*—(*M.P.*)

Function of Calcium.—The pathological changes incident to a tuberculous infection depend upon various conditions involving the tubercle bacillus and the bodily tissues. The morphological types of the microörganism, its virulence and the frequency of infection play a major rôle. The portal of entry is of great importance in determining the localization of the disease. Humoral changes are important in that they determine the amount of immunity which the body is able to develop and thus prevent diffusion of the germs. These changes depend upon the quantity of calcium present. Calcium is deposited in all forms of healing. More calcium is present in lungs with fibrosis and inactive lesions than in the more active types of tuberculosis. Calcium is therefore necessary to establish protective barriers against further development and dissemination of the tubercle bacilli.—*Nuovi concetti sulla funzione del calcio nell'organismo, A. Campani, Tubercolosi, December, 1932, xxiv, 401.*—(*U. E. Z.*)

Pathological Alterations in Leucocytes.—The pathological alterations of leucocytes are more or less indicative of the pathological developments in tuberculous lesions. They are usually more pronounced during acute exacerbations and during exudative phases. There does not exist any relation between the extent of the lesion and the leucocytic changes. The numerical relation of the various white cells seems to be a more delicate indicator for the developmental course of tuberculosis than the pathological changes in the neutrophilic leucocytes.—*Über die pathologischen qualitativen Veränderungen der Leukocyten bei Tuberkulose, M. Reale, Beitr. z. Klin. d. Tuberk., February, 1933, lxxxii, 180.*—(*M.P.*)

Toxic Granulation of Leucocytes.—Toxic granulations in leucocytes are a frequent occurrence in pulmonary tuberculosis. They are much more pronounced in exudative than in productive lesions, but, since they occur in either, their presence cannot be used diagnostically or prognostically.—*Über die toxische Granulation der Leukocyten bei Tuberkulose, J. Leitner and W. Eichhorn, Beitr. z. Klin. d. Tuberk., February, 1933, lxxxii, 173.*—(*M. P.*)

Changes in Red Cells in Pleural Effusions.—Erythrocytes in effusions often show structural changes, especially in a tendency to shrink. Examination was made of 50 pleural effusions from cases of traumatic haemothorax, parapneumonic pleurisy, empyema and hydropneumothorax, attention being paid especially to the erythrocytes. A plain smear was employed. Examination from the standpoint of content of albumen of the pleural fluid, the freezing-point and the alkali reserve, gave no indication as to the expected percentage of shrunken erythrocytes, which at times were up to 50 per cent. However, this stood in direct ratio to the time elapsed since onset of the effusion. The maximum of shrunken erythrocytes occurs at about the 30th or 40th day, when haemolysis sets in. About the 160th day the erythrocytes have disappeared completely.—*Über die Formveränderungen der Erythrozyten in Pleuraergüssen, F. Labendzinski, Deutsche med. Wchnschr., December 23, 1932, lviii, 2031.*—(*H. S. W.*)

Anaerobic Microörganisms in Respiratory Tract.—The results obtained in this study tend to support the conclusions of previous observers that the filter-passing, gram-negative, anaerobic organisms constitute a part of the bacterial flora of the normal nasopharynx. In the group of persons with colds, however, the percentage incidence of the anaerobes was considerably higher than had been previously reported. The variation in infestation among normal persons bore no

relation to the anatomical configuration of the nasopharynx, but it was noted that the anaerobes were more frequently encountered in those who suffered from frequent infections of the upper respiratory tract. The aetiological rôle of these organisms acting as secondary invaders in infections of the upper respiratory tract is still uncertain, but it is possible that under favorable conditions they may assume a pathogenic rôle. This was illustrated by the recovery of pleomorphic, fusospirillary, anaerobic, filter-passing organisms from the filtrates of purulent material obtained from the antra of a person ill with chronic sinusitis. Here the organisms were present in pure culture, as repeated aerobic cultures remained sterile, and in this instance one must assume that they played an aetiological rôle in the production of the chronic sinusitis.—*Incidence of Anaerobic, Filter-Passing Organisms in Normal and in Abnormal Respiratory Tract Infections, P. H. Long and B. Muellerschoen, J. Infec. Dis., January, February, 1933, lii, 121.*—(*F. G. P.*).

Acid-Fast Bacilli.—In 1883 Koch spoke of the possible existence of bacteria other than tubercle bacilli which might be acid-resistant. The so-called smegma bacillus was discovered in 1885, and still plays a rôle in leading to wrong diagnosis. Serious errors, such as the removal of a suspected tuberculous kidney, can be avoided with almost absolute certainty if only catheterized specimens of urine are examined and painstaking staining methods are employed. Soon after Koch's discovery of the tubercle bacillus, the bacteriological world became interested in another group of acid-fast bacilli. They were found in milk and butter, on grasses, and in the soil. They were easily cultured and easily distinguished from tubercle and smegma bacilli. In 1909 and 1910 acid-fast bacilli of another type were found to be in common tap-water. In Frankfort 72 per cent of the water-taps yielded positive cultures. Very little nutritional substance is necessary for their growth, but oxygen must be present. The explanation of their being found not only in the taps, but also in completely protected tanks of water, may be that they are brought in from the outside. The assumption that these bacilli can be transmuted forms of other bacilli cannot be accepted as proved. A more limited assumption would be that not all forms of bacteria become acid-fast by the conditions of life on the metal water-tap, but only those species of bacilli which were not acid-fast, but had the latent disposition to become so, can assume this characteristic after contact with metal taps. There is one group which can be separated from other bacteria. These are nonmotile, have no spores, produce no indol, in general produce no gas with sugars, and grow with a yellowish or yellowish-brown color. They can easily be distinguished from the tubercle bacillus of warm-blooded animals by their growth on gelatine and at temperatures of 20° to 30°. But the differentiation from tubercle bacilli of cold-blooded animals is much more difficult; in fact, they are considered identical by some. The old dogma that a sufficient layer of suitable earth produces a water completely sterile is untrue for these types of bacteria can be produced. They have no sanitary importance. The whole realm of acid-fast water-pipe bacilli takes its origin from our data on acid-fast ground bacilli. There can be no doubt that the presence of certain metals affects the growth of certain bacteria. This is especially true of copper, which may retard the growth of some and augment that of others. The widespread presence of these bacteria is important. There are too few reports concerning their presence on the skin and in the mouths of primitive people not in contact with water-pipes. But they are reported to have been found in the mouth, on the tonsils and on the teeth in high percentages of people. This has not been confirmed by others, but their presence is undoubted in some cases. The last group of acid-fast bacilli to be considered is that group found on the musical wind-instruments. They are found in practically all metal instruments but less frequently in the wooden ones. But even here they are plentiful around the metal keys and metal mouthpieces. These bacteria are probably of the group found in water-pipes. Confusion in diagnosis can result when they are found upon the instrument of a person with tuberculosis. But even here they can be separated from the tubercle bacilli. In spite of the widespread distribution of these various acid-fast bacilli, the diagnosis of tuberculosis is still solid. Culturally, the two groups are easily distinguishable. The presence of acid-fast organisms in the sputum without other evidence cannot make the diagnosis of tuberculosis. A single specimen which shows acid-fast organisms cannot be decisive. In doubtful cases culture methods should be used.—*Some New Investigations Regarding Old Bacteriological Problems. Tubercle-like Acid-fast Bacilli, M. Neisser, J. State Med., February, 1933, xli, 63.*—(*J. F. B.*)

Acid-Fast Bacilli.—Saprophytic acid-fast microörganisms have been described as occurring in man as well as nature. A more interesting group isolated from lesions in man

consists of a number of pathogenic acid-fast microörganisms which have been proved not to be mammalian tubercle bacilli. Through the courtesy of various investigators, a number of such microörganisms were collected and studied in one laboratory by a uniform procedure. These various strains were first identified as being tubercle bacilli or not, and, if they were tubercle bacilli, whether they were avain or mammalian strains. The birds used for inoculation were all carefully tested to obviate the possibility of spontaneous infection. Inoculation of the common white mouse proved a useful aid in diagnosing acid-fast strains which are not type tubercle bacilli or saprophytes. After large intraperitoneal doses multiple abscesses developed in the kidneys. Some of the nonmammalian tubercle bacilli strains apparently belonged to the avian group while others were not type tubercle bacilli but probably new strains of pathogenic acid-fast bacteria. Particular difficulty was encountered in diagnosing strains of avirulent avian tubercle bacilli. However, in spite of the fact that these microörganisms do not produce progressive tuberculosis in the fowl, it was justifiable by the cultural characteristics, the ability to form tuberculin, the lesions produced in the rabbits, and the ability to absorb agglutinins from a virulent avian tubercle-bacillus rabbit antiserum to conclude these strains to be avian tubercle bacilli of diminished virulence. Avirulent avian tubercle bacilli are capable of forming tuberculin and of sensitising fowls to a known tuberculin.—*A Study of Acid-Fast Organisms Other than Mammalian Tubercle Bacilli Isolated from Disease in Man, A. Branch, Tubercle, May, 1933, xiv, 337.*—(*T. O. R.*)

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